

May 27, 2003

Mr. J. A. Scalice
Chief Nuclear Officer and
Executive Vice President
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2 - ISSUANCE OF
AMENDMENTS REGARDING INCREASING CONDENSATE STORAGE
TANK MINIMUM VOLUME TECHNICAL SPECIFICATION
REQUIREMENTS (TAC NOS. MB7205 AND MB7206) (TSC 02-06)

Dear Mr. Scalice:

The Commission has issued the enclosed Amendment No. 286 to Facility Operating License No. DPR-77 and Amendment No. 275 to Facility Operating License No. DPR-79 for the Sequoyah Nuclear Plant, Units 1 and 2, respectively. These amendments are in response to your application dated November 15, 2002, as supplemented with letters dated February 28, 2003, March 14, 2003, and April 25, 2003. The Amendments revise the Technical Specification 3.7.1.3, "Condensate Storage Water," Limiting Condition for Operation by increasing the required minimum amount of stored water from 190,000 gallons to 240,000 gallons.

A copy of the Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA/

Michael L. Marshall, Jr., Senior Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-327 and 50-328

Enclosures: 1. Amendment No. 286 to
License No. DPR-77
2. Amendment No. 275 to
License No. DPR-79
3. Safety Evaluation

cc w/enclosures: See next page

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TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-327

SEQUOYAH NUCLEAR PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 286
License No. DPR-77

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Tennessee Valley Authority (the licensee) dated November 15, 2002, as supplemented with letters dated February 28, 2003, March 14, 2003, and April 25, 2003, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. DPR-77 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 286, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance, to be implemented no later than 45 days after issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RAI

Allen G. Howe, Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications

Date of Issuance: May 27, 2003

ATTACHMENT TO LICENSE AMENDMENT NO. 286

FACILITY OPERATING LICENSE NO. DPR-77

DOCKET NO. 50-327

Replace the following page of the Appendix A Technical Specifications with the attached page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

REMOVE

3/4 7-7

INSERT

3/4 7-7

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-328

SEQUOYAH NUCLEAR PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 275
License No. DPR-79

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Tennessee Valley Authority (the licensee) dated November 15, 2002, as supplemented with letters dated February 28, 2003, March 14, 2003, and April 25, 2003, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. DPR-79 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 275, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Allen G. Howe, Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications

Date of Issuance: May 27, 2003

ATTACHMENT TO LICENSE AMENDMENT NO. 275

FACILITY OPERATING LICENSE NO. DPR-79

DOCKET NO. 50-328

Replace the following page of the Appendix A Technical Specifications with the attached page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

REMOVE

3/4 7-7

INSERT

3/4 7-7

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 286 TO FACILITY OPERATING LICENSE NO. DPR-77
AND AMENDMENT NO. 275 TO FACILITY OPERATING LICENSE NO. DPR-79
TENNESSEE VALLEY AUTHORITY
SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2
DOCKET NOS. 50-327 AND 50-328

1.0 INTRODUCTION

By application dated November 15, 2002, as supplemented by letters dated February 28, 2003, March 14, 2003, and April 25, 2003, the Tennessee Valley Authority (the licensee, TVA) proposed an amendment to the Technical Specifications (TSs) for Sequoyah Nuclear Plant (SQN), Units 1 and 2. The requested changes would revise the TS 3.7.1.3, "Condensate Storage Water," Limiting Condition for Operation by increasing the required minimum amount of stored water from 190,000 gallons to 240,000 gallons. The February 28, March 14, and April 25, 2003 letters provided clarifying information that did not change the initial proposed no significant hazards consideration determination or expand the scope of the application.

2.0 REGULATORY EVALUATION

Section 50 of Title 10 of the *Code of Federal Regulations* (10 CFR 50), Appendix A, "General Design Criteria for Nuclear Power Plants," Criterion 34, "Residual Heat Removal," requires that a system be provided to remove fission product decay heat and other residual heat from the reactor core. This heat removal prevents violation of the specified acceptable fuel design limits and the design conditions of the reactor coolant pressure boundary.

Consistent with the current licensing basis at SQN, the essential raw cooling water (ERCW) system provides this function with an unlimited source of safety grade water. But for the preferred source of auxiliary feedwater (AFW) supply, the current licensing basis for SQN requires that the condensate storage tank (CST) supply be capable of holding the unit in hot standby for 2 hours, followed by a cooldown to residual heat removal (RHR) entry condition (hot shutdown) within 6 hours.

TVA plans to replace the SQN, Unit 1 steam generators (SGs) in the spring of 2003. Because of physical differences between the original and replacement SGs (i.e., greater structural mass), the new generators require more water to cool down. Therefore, TVA reanalyzed the supply requirements for the replacement SGs and proposed an increase from 190,000 to 240,000 gallons. To assure that SQN continues to meet its licensing basis for CST volume with

the new generators, the staff will verify that the proposed volume is adequate to hold the unit in hot standby for 2 hours, followed by a cooldown to RHR entry conditions (hot shutdown) within 6 hours.

3.0 TECHNICAL EVALUATION

The current CST minimum water volume of 190,000 gallons met the licensee's previous cooldown requirements. These requirements included maintaining the reactor coolant system (RCS) in hot standby for 2 hours with steam discharge to the atmosphere and a concurrent loss of off-site power, followed by a reduction to hot shutdown conditions within the following 6 hours.

To determine the new CST water volume requirements, the licensee performed steady state heat balance calculations following the first law of thermodynamics, similar to the original water volume calculation. Several assumptions from the original water volume calculation remained in this updated version, including the loss of all reactor coolant pumps and the cooldown period of 8 hours. Because these assumptions follow the original licensing basis, the U.S. Nuclear Regulatory Commission (NRC) staff finds them acceptable.

However, the following assumptions changed: (1) The structural mass of the replacement SGs increased, (2) the AFW temperature increased from 100 °F to 120 °F, and (3) the new calculations include the volume of water needed to refill the SGs. All three of these changes are conservative and provide for an increase to the required CST water volume to account for the changes in the plant. Because these changes are conservative, the NRC staff finds them acceptable.

The licensee changed its original decay heat model from the 1970 Westinghouse decay heat model to the 1994 American Nuclear Society (ANS) standard decay heat model. In the calculation, the licensee used the 1994 ANS simplified method for determination of the decay heat power and uncertainty. In addition, to estimate the contribution to decay heat from heavy actinides, TVA employed a Babcock & Wilcox (B&W) Heavy Actinide model. To verify the validity of the B&W model, the staff compared it to the 1994 ANS standard model for actinides. During the comparison the NRC staff identified three concerns.

- (1) Over the 8-hour period assumed in the analysis the B&W model predicted an actinide contribution that is nearly 1 percent lower than that predicted by the 1994 ANS model.
- (2) Additionally, Research Information Letter (RIL) 0202 identified that over the first 8 hours of modeling, the 1994 ANS standard could be up to 6 percent nonconservative for the decay heat contribution of the actinides.
- (3) Furthermore, RIL 0202 also identified that the simplified method of the 1994 ANS standard contained an error (i.e., Equation 13) for determining the decay heat power uncertainty.

The staff determined that correcting the first concern would increase the CST volume requirement by 161 gallons. The second concern was addressed by the licensee including a 6-percent uncertainty to its B&W decay heat model that would increase the CST volume

requirement by 949 gallons. The licensee stated that correcting the third concern would increase the CST volume requirements by 3589 gallons. So, the licensee's calculation underpredicts CST volume requirements by roughly 4700 gallons. However, the licensee's calculations show that SQN has a margin of 12,000 gallons between the calculated requirements and the proposed TS value. Because the licensee accounted for the NRC staff identified concerns with the 1994 ANS decay heat standard, and because the proposed TS limit bounds the necessary energy removal requirements, the staff finds the limit acceptable.

The NRC staff audited the licensee's calculations against the cooldown requirements of Branch Technical Position (BTP) RSB 5-1. In its response, TVA indicated that it meets BTP RSB 5-1 by having an adequate alternate seismic Category 1 AFW supply, the ERCW system. The staff evaluated whether the system could actually cool the plant down according to the SQN assumptions (i.e., 2-hour hold followed by a 6-hour cooldown), and by following this cooldown curve, the calculated CST volume would not be exceeded. TVA indicated that its AFW system would exceed the flow requirements for the above cooldown period, even with one of the AFW pumps inoperable. Therefore, the flow rate would be adequate to meet the cooldown requirements. Additionally, TVA indicated that, for the fixed time period, the energy removal requirements from hot standby to hot shutdown remain independent of cooldown rate. Therefore, over the 8-hour period, the required volume of CST water would be equivalent regardless of the rate of cooldown. SQN would not exceed the calculated CST volume by following the cooldown curve. Because the AFW system provides sufficient flow to follow the cooldown curve, and because the calculated CST volume will be adequate for the cooldown assumptions, the staff finds the SQN cooldown assumptions acceptable.

The licensee based its calculation on a heat balance with an assumed control volume and fixed heat inputs. However, the staff noted that the calculations did not include all of the possible mixing volumes and heat inputs, specifically, the possible mixing water volumes upstream of the AFW entry point and the heat added by the reactor coolant pumps during coastdown and the AFW pumps during the cooldown period. TVA stated that the added energy requirements from feedwater upstream of the AFW entry point would add 435 gallons to the required CST inventory, whereas the reactor coolant pump coastdown and AFW pump heat would add 449 gallons and 1435 gallons respectively. The licensee's calculations show that SQN would only need 228,000 gallons of CST inventory for the RCS cooldown. With the added volume requirement of 2319 gallons, the 240,000 gallon proposed TS limit would still be bounding. Because the proposed TS limit bounds the necessary energy removal requirements, the staff finds the limit acceptable.

Because of standpipe locations, pump vortexing, net positive suction head requirements, and level instrumentation automatic switchover with uncertainty, CSTs typically contain a large volume that is unusable. The NRC staff assessed whether TVA adequately accounted for the unusable volume in the calculations to ensure that the usable volume would be adequate to meet the cooldown requirements. TVA indicated that the standpipe locations, pump vortexing levels, and net positive suction head level requirements all fall below the 0-percent level indicated on the CST level instrumentation. At the 0-percent level approximately 18,600 gallons of CST water volume will be unusable. The CST would automatically switch over prior to reaching the 0-percent level to the Category I ERCW system. The proposed wording of the TS accounts for the unusable volume:

[a] condensate storage tank system (CST) shall be OPERABLE with a water level of at least 240,000 gallons of water.

Since the proposed wording of the TS accounts for the unusable portion of the CST volume, the NRC staff finds that TVA adequately accounted for the unusable CST volume.

In summary, TVA's calculations show that the minimum required CST water level would be 228,000 gallons. When including the heat sources of the reactor coolant pump coastdown and the AFW pumps, available water volumes upstream of the AFW entry point, and conservative decay heat values, the minimum required CST water volume would be approximately 236,000 gallons. Given that the proposed CST level of 240,000 gallons bounds this value and that the TSs account for unusable CST volume, the NRC staff finds that the licensee's proposed CST water level will provide adequate supply to meet the SQN licensing basis cooldown requirements and to hold the unit in hot standby for 2 hours, followed by a cooldown to RHR entry conditions (hot shutdown) within 6 hours. Therefore, the staff finds the proposed TS changes acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Tennessee State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (68 FR 5682). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

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Dated: May 27, 2003

Mr. J. A. Scalice
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SEQUOYAH NUCLEAR PLANT

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